

IN THE CLAIMS:

Please cancel Claims 14, 15, 18, 21 and 22 without prejudice to or disclaimer of the subject matter recited therein.

Please amend Claims 1 to 13, 16, 17, 19 and 20 to read as follows.

1. (Currently Amended) A control apparatus for a vibration type actuator, which makes driving vibration at a driving unit of a vibration member by applying an alternating signal to an electro-mechanical energy conversion element and uses at least a frequency of the alternating signal as a speed control parameter, said control apparatus comprising:

a driving circuit capable of changing a ~~driving~~ voltage of the alternating signal to be applied to said electro-mechanical energy conversion element; and

a control unit communicatively coupled to said driving circuit,

wherein said control unit causes said driving circuit to change the voltage of the alternating signal ~~circuit which controls said driving circuit~~ so that at least an absolute value of a slope of a frequency-speed characteristic of said actuator is within a desired range in a frequency band of predetermined range.

2. (Currently Amended) A control apparatus for a vibration type actuator, which makes driving vibration at a driving unit of a vibration member by applying an alternating signal to an electro-mechanical energy conversion element and uses at least a frequency of the alternating signal as a speed control parameter, said control apparatus comprising:

a driving circuit capable of changing a ~~driving~~ voltage of the alternating signal to be applied to said electro-mechanical energy conversion element; and

a control unit communicatively coupled to said driving circuit,

wherein said control unit causes said driving circuit to change the voltage of the alternating signal ~~circuit which controls said driving circuit~~ so that an absolute value of a slope of a frequency-speed characteristic of said actuator is equal to or greater than a predetermined value at least in a frequency band of predetermined range.

3. (Currently Amended) An apparatus according to Claim 1, wherein said control circuit sets a change rate of the ~~driving~~ voltage relative to the frequency.

4. (Currently Amended) An apparatus according to Claim 2, wherein said control circuit sets a change rate of the ~~driving~~ voltage relative to the frequency.

5. (Currently Amended) An apparatus according to Claim 1, wherein said driving circuit includes a switching circuit which performs on and off operations in response to a driving pulse and applies a voltage according to the switching operation of said switching circuit to said electro-mechanical energy conversion element, and said control unit ~~circuit~~ changes the width of the driving pulse according to the frequency so that the absolute value of the slope of the frequency-speed characteristic of said actuator is within the predetermined range.

6. (Currently Amended) An apparatus according to Claim 2, wherein said driving circuit includes a switching circuit which performs on and off operations in response to a driving pulse and applies a voltage according to the switching operation of said switching circuit to said electro-mechanical energy conversion element, and said control unit ~~circuit~~ changes the width of the driving pulse according to the frequency so that the absolute value of the slope of the frequency-speed characteristic of said actuator is equal to or greater than the predetermined value.

7. (Currently Amended) An apparatus according to Claim 1, further comprising a detection circuit which detects a speed and/or a position of said vibration type actuator, wherein said control unit circuit changes the ~~driving~~ voltage on the basis of detection information from said detection circuit if said actuator reaches a predetermined position or a predetermined movement amount.

8. (Currently Amended) A control apparatus for a vibration type actuator, which makes driving vibration at a driving unit of a vibration member by applying an alternating signal to an electro-mechanical energy conversion element and controls at least a frequency of an alternating signal as a speed control parameter, said control apparatus comprising:

a driving circuit capable of changing a ~~driving~~ voltage of the alternating signal to be applied to said electro-mechanical energy conversion element; and

a control unit communicatively coupled to said driving circuit,

wherein said control unit controls said driving circuit for at least performing ~~control~~ in a frequency range higher than a predetermined frequency so that the ~~driving voltage of the alternating signal to be applied to said electro-mechanical energy conversion element by said driving circuit~~ decreases as the predetermined frequency becomes a higher frequency.

9. (Currently Amended) An apparatus according to Claim 8, wherein said control unit circuit decreases the ~~driving~~ voltage to be applied to said electro-mechanical energy conversion element as the predetermined frequency becomes a higher frequency so that an absolute value of a slope of a frequency-speed characteristic in the case of changing a frequency of said actuator by a unit amount is within a predetermined range or is equal to or greater than a predetermined value.

10. (Currently Amended) An apparatus according to Claim 8, wherein the ~~driving~~ voltage is changed by changing a driving pulse width in said driving circuit for applying the ~~driving~~ voltage to said electro-mechanical energy conversion element.

11. (Currently Amended) An apparatus according to Claim 8, wherein the ~~driving~~ voltage is changed by changing a gain of an amplifier in said driving circuit for applying the ~~driving~~ voltage to said electro-mechanical energy conversion element.

12. (Currently Amended) A control method for a vibration type actuator which makes driving vibration at a driving unit of a vibration member by applying an alternating signal to an electro-mechanical energy conversion element and uses at least a frequency of the alternating signal as a speed control parameter, said control method comprising the steps of:

applying an alternating signal to the electro-mechanical energy conversion element; and

changing a ~~driving~~ voltage of the alternating signal to be applied by a ~~driving circuit~~ to the electro-mechanical energy conversion element; ~~and~~

~~controlling the driving circuit~~ so that at least an absolute value of a slope of a frequency-speed characteristic of the actuator is within a desired range in a frequency band of predetermined range.

13. (Currently Amended) A control method for a vibration type actuator which makes driving vibration at a driving unit of a vibration member by applying an alternating signal to an electro-mechanical energy conversion element and uses at least a frequency of the alternating signal as a speed control parameter, said control method comprising the steps of:

applying an alternating signal to the electro-mechanical energy conversion element; and

changing a ~~driving~~ voltage of the alternating signal to be applied ~~by a driving circuit~~ to the electro-mechanical energy conversion element; and

~~controlling the driving circuit~~ so that an absolute value of a slope of a frequency-speed characteristic of the actuator is equal to or greater than a predetermined value at least in a frequency band of predetermined range.

Claims 14 and 15 (Cancelled).

16. (Currently Amended) A control method according to Claim 12, wherein said changing step includes performing on and off operations of a switching circuit in response to a driving pulse and applying a voltage according to the on and off switching operation to the electro-mechanical energy conversion element, and ~~said controlling step includes~~ changing the width of the driving pulse according to the frequency so that the absolute value of the slope of the frequency-speed characteristic of the actuator is within the predetermined range.

17. (Currently Amended) A control method according to Claim 13, wherein said changing step includes performing on and off operations of a switching circuit in response to a driving pulse and applying a voltage according to the on and off switching operation to the electro-mechanical energy conversion element, and ~~said controlling step includes~~ changing the width of the driving pulse according to the frequency so that the absolute value of the slope of the frequency-speed characteristic of the actuator is equal to or greater than the predetermined value.

Claim 18 (Cancelled).

19. (Currently Amended) A control method for a vibration type actuator which makes driving vibration at a driving unit of a vibration member by applying an alternating signal to an electro-mechanical energy conversion element and controls at least a frequency of an alternating signal as a speed control parameter, said control method comprising the steps of:

applying an alternating signal to the electro-mechanical energy conversion element; and

~~changing a driving voltage of the alternating signal to be applied by a driving circuit to the electro-mechanical energy conversion element; and~~

~~at least performing control in a frequency range higher than a predetermined frequency so that the driving voltage of the alternating signal to be applied to the electro-mechanical energy conversion element by the driving circuit decreases as the predetermined frequency becomes a higher frequency.~~

20. (Currently Amended) A control method according to Claim 19, wherein said changing ~~controlling~~ step includes decreasing the ~~driving~~ voltage to be applied to the electro-mechanical energy conversion element as the predetermined frequency becomes a higher frequency so that an absolute value of a slope of a frequency-speed characteristic in the case of changing a frequency of the actuator by a unit amount is within a predetermined range or is equal to or greater than a predetermined value.

Claims 21 and 22 (Cancelled).